2/2/16 "By failing to prepare, you are preparing to fail" -Ben Franklin

HW: Text page 216 # 42, 46, 50, 56

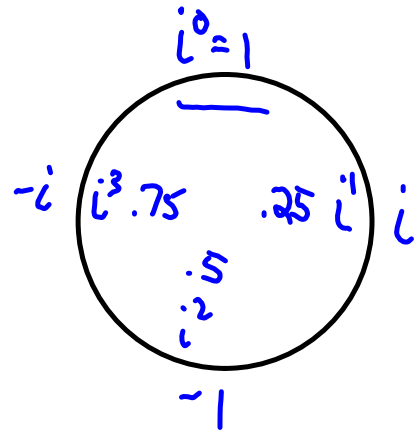
AIM: How do we divide complex numbers?

Warm Up:

1) What is the conjugate of $3+\sqrt{2}$? $3-\sqrt{2}$

2) $i = i$ $i^2 = -1$

$i^3 = -i$ $i^4 = 1$



power / 4 OR use i^{part} (i^{power})

MATH ⇒ 3

Dividing complex numbers is done similar to rationalizing the denominator

- multiply both numerator and denominator by the conjugate of the denominator
- simplify if possible

3) $\frac{2+3i}{1+2i} \cdot \frac{1-2i}{1-2i} = \frac{2-4i+3i+6}{1-4i^2} = \frac{8-1i}{5} = \frac{8-i}{5}$

$2-4i+3i+6$

$1-4(-1)$

$1--4$

$1+4$

$= \frac{8}{5} - \frac{1}{5}i$

a+bi form

4) $\frac{5+10i}{\frac{1}{2}-\frac{2}{3}i}$

5) $\frac{10-5i}{2+6i}$

$$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\frac{1}{(2+\sqrt{3})} \cdot \frac{(2-\sqrt{3})}{(2-\sqrt{3})} = \frac{2-\sqrt{3}}{4-3} = \frac{2-\sqrt{3}}{1}$$

$-2\sqrt{3}+2\sqrt{3}$

$(x+3)(x-3)$

x^2-9 DOTS

(*) When multiplying CONJUGATES, you only need to square the first, square the second and subtract.

Ex: $(2+\sqrt{5})(2-\sqrt{5})$

$2^2-(\sqrt{5})^2$

$4-\sqrt{25}$

$4-5=\boxed{-1}$

$(2+5i)(2-5i)$

$2^2-(5i)^2$

$4-25i^2$

$4-(25)(-1)$

$4-(-25)$

$4+25=\boxed{29}$

6) $(a+bi)(a-bi)$

$a^2 - abi + abi + b^2i^2$

$a^2 + b^2$

7) What is the multiplicative Inverse of 3+2*i* ?

(reciprocal)

Multipicative Inverse $= \frac{1}{3+2i}$ ← Fix it

$\frac{1}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{3-2i}{9+4i^2} = \frac{3-2i}{13}$

HW Check:

46) $(8+4i) \div (1+i) = \frac{8+4i}{1+i}$

$\frac{8+4i}{1+i} \cdot \frac{(1-i)}{(1-i)} = \frac{8-8i+4i+4}{1-i^2} = \frac{12-4i}{1-(-1)} = \frac{12-4i}{2}$

$\frac{12}{2} - \frac{4}{2}i \Rightarrow \boxed{6-2i}$

50) $\frac{2+2i}{4-2i} \cdot \frac{4+2i}{4+2i} = \frac{8+4i+8i+4i^2}{16+4i^2} = \frac{4+12i}{20}$

-4

Cross out i^2 and switch sign

$\frac{4+12i}{20} = \frac{4(1+3i)}{20} = \frac{1+3i}{5} = \boxed{\frac{1}{5}+\frac{3}{5}i}$

56) $\frac{8+6i}{2i} \cdot \frac{(-2i)}{(-2i)} = \frac{-16i+12i^2}{+4i^2} = \frac{12-16i}{4}$

$= \boxed{3-4i}$

8) What is the multiplicative Inverse of:

$a+bi$?

General form

$$\frac{1}{a+bi}\cdot\frac{a-bi}{a-bi}=\frac{a-bi}{a^2+b^2i^2}=\boxed{\frac{a-bi}{a^2+b^2}}$$

conjugate

9) Mult Inverse of:

$6-2i \longrightarrow \frac{6+2i}{6^2+2^2}=\frac{6+2i}{36+4}=\frac{6+2i}{40}$

HW Text Page 216

#39, 40, 43

$=\frac{3+i}{20}$ Simplified